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January 1954

PITFALLS IN THE DIAGNOSIS OF BACKACHE

By H. A. BURT, W. D. FLETCHER, and S. MATTINGLY

From the Department of Physical Medicine, University College Hospital, London

OUR purpose in this paper is to discuss difficulties in diagnosis which we have encountered among patients referred to a Department of Physical Medicine because of pain in the back. These patients fall into three groups: (A) those with visceral disease in whom involvement of the retroperitoneal tissues gave rise to backache; in this group such physical signs as there were suggested that pain was somatic in origin; (B) those with disease of vertebrae in whom the history and physical signs were suggestive of the disk syndrome; and (C) those with sacro-iliac disease who when first seen had minimal physical signs and normal radiographs and were thought to be psychoneurotic.

The scheme of presentation we have adopted is to give a report of the cases in each group followed by a discussion of the group as a whole.

(A) Pain of Retroperitoneal Origin

CASE 1.—Mr. E. S., a fat, healthy-looking man aged 52, was admitted to hospital in January, 1952, complaining of attacks of severe pain in the mid-dorsal region for ten weeks. These painful episodes occurred several times a day, usually lasting about an hour; they had woken him at night. The pain usually radiated to the left side, sometimes to the right. Between attacks he was quite comfortable. He gave no past history of indigestion or back pain. His general practitioner had seen him during an attack and was convinced that the pain was genuine and severe. On examination there were no abnormal physical signs apart from some tenderness over the mid-dorsal spines and an area of hyperaesthesia in the lower dorsal region. Biochemical and haematological findings were normal. Radiographs showed moderately severe osteoarthritic changes and osteoporosis.

The patient was observed during several attacks of pain, for which he was given "physeptone". At this stage the following diagnoses were considered: (1) thoracic disk lesion; (2) post-herpetic pain; and (3) dissecting aneurysm. Barium-meal examination carried out as a last resort, however, showed a large duodenal ulcer. Medical treatment did not relieve his symptoms, and a partial gastrectomy was performed. A penetrating duodenal ulcer involving retroperitoneal structures was found. Complete relief of symptoms followed operation.

CASE 2.—Mrs. D. I., aged 32, first attended the Department of Physical Medicine in August, 1952. She had a five-years history of dorsal backache with epigastric pain. The pain occurred in bouts; it was not related to food and was unrelieved by alkaline powders. There was a history of nausea and vomiting. Repeated barium-meal examinations elsewhere were negative, and no abnormality had been found at laparotomy a year previously. From May to July, 1952, she was in another hospital for investigation. It was there observed that her posture was bad, and it was suggested that her pain arose from the interspinous ligaments and was referred to the epigastrium. She was thereupon sent to University College Hospital for postural exercises. On examination she was noted to be a pale, thin, anxious woman with a grossly abnormal posture of the sway-back type. Pain could not be reproduced, however, on movements of the spine.

After a month's treatment with exercises she stated that her backache was less but that the epigastric pain was unchanged. "Aludrox" was prescribed without effect, and later the patient was advised to try soda bicarbonate; each time she took this, eructation was followed by complete relief of epigastric pain with gradual subsidence of her backache. In view of this, a very careful search was made during a further barium-meal investigation and a deep ulcer was found high up on the lesser curvature of the stomach. This proved resistant to treatment, and healed only after a prolonged stay in hospital. The patient then became completely free of symptoms.

CASE 3.—Mrs. E. W., aged 69, was admitted to hospital in January, 1950, complaining of severe low back pain of three months' duration and loss of 3 stones in weight over the previous year. She had suffered from flatulent dyspepsia for many years, and three years previously had an attack of biliary colic. Physical examination of her spine revealed restricted movements in all directions, *but did not reproduce her pain.* Previous to her admission to hospital radiographs showed a radio-opaque gall-stone and marked osteoarthritis of the lumbar spine. Extensive investigations in hospital showed that there was no impairment of gall-bladder function and no other abnormality apart from repeatedly positive tests for occult blood in the stools. Her erythrocyte sedimentation rate (E.S.R.) at this time was 15 mm. in one hour (Westergren).

She was not relieved by rest in bed or physiotherapy, and it was thought that she might have secondary deposits in her spine from an unidentified visceral carcinoma. She was therefore given a course of radiotherapy; this however, did not relieve the pain. Further radiographs of her spine were taken in July, 1950, but no abnormality was detected. She was readmitted for investigation later in the month, and again the only finding was repeatedly positive occult blood tests.

In view of this a laparotomy was performed. Almost the whole of the area of the pancreas was occupied by a nodular mass believed to be the primary carcinoma.

CASE 4.—Mr. L. B., a negro of 62, known to be syphilitic, was referred from the diabetic clinic in May, 1953, with a three-months history of low back pain. On inquiry it became clear that there were two different components: (1) pain starting in the low back and radiating to both flanks, which was aggravated by spinal movement and relieved by rest; and (2) lower dorsal pain with anterior radiation which came on in severe episodes, usually at rest. He had lost 7 stones in weight in nine months. On examination he was found to have a stiff lumbar spine; ankle-jerks were absent and there was some diminution of deep pain sense in the tendo Achillis. His E.S.R. was 23 mm. in one hour. Radiographs of the lumbar spine showed marked sclerosis of the left lumbar intervertebral joints and rarefaction of the body of L4. He was admitted to hospital for investigation.

While there he had severe attacks of lower dorsal pain which usually came on between 9 and 10 a.m. To relieve these he was given physeptone. Biochemical and haematological tests gave negative results apart from a raised E.S.R. and occult blood in the stools; the Wassermann and Kahn reactions were negative. Findings on barium-meal investigation were normal. Radiographs of the pelvis and skull showed secondary deposits, but the primary tumour could not be demonstrated. He died in July, 1953, from bronchopneumonia. At autopsy he was found to have a carcinoma of the pancreas involving the whole of the body except for a small area surrounding the bile duct, hence the absence of jaundice. No secondaries were found in the lower thoracic or upper lumbar spine.

CASE 5.—Mr. H. A., aged 57, previously treated in hospital for suspected duodenal ulcer, was referred to the Department of Physical Medicine in October, 1952, with two months' history of a dull ache in the lumbar region radiating to the left side of the abdomen. At times the pain was very severe; it was not related to food or relieved by alkalis. He had lost 1 stone in weight. After careful examination we considered that the pain was not skeletal in origin, although there was local tenderness of the erector spinae and radiographs showed considerable disk degeneration. Further investigations in hospital failed to reveal any definite abnormality except an E.S.R. of 15 mm.; tests for occult blood were negative; there were equivocal findings on barium-meal examination, but gastroscopic appearances were normal. The pain was relieved for a short time by lying the patient on a hot-water bottle and by injection of procaine into the substance of the erector spinae. The patient's wife was convinced he was exaggerating his symptoms, and this led to a functional origin for his pain being suspected. In December, however, only two months later, he developed intestinal obstruction. At laparotomy an inoperable carcinoma of the pancreas with extensive involvement of the structures of the posterior abdominal wall was found; the perineurium of the nerve fibres was infiltrated with mucus-secreting carcinoma cells (Plate I). The patient died after perforation of the duodenum occurred in February, 1953.

DISCUSSION

This group of cases well illustrates the difficulties of diagnosis when backache, with or without anterior radiation, is of retroperitoneal origin.

In all five patients definite evidence of visceral disease was lacking, although in Cases 2, 3, and 5 it had been suspected but not confirmed by intensive investigation in hospital, including laparotomy (Case 2). Case 1, with a chronic duodenal ulcer, gave no history whatsoever of dyspepsia or abdominal pain; the patient was not relieved by alkalis or ulcer diet. Case 4 was already under treatment for diabetes mellitus, and abdominal disease was not suspected.

The five patients were referred to us for treatment of somatic pain, and indeed in all five there were abnormal physical signs in the musculo-skeletal system. Cases 1, 3, 4, and 5 had some limitation of spinal movement, tenderness on palpation of the erector spinae, and radiological appearances of osteoarthritis; Case 2 had a grossly abnormal posture.

There were, however, two features which were at variance with a diagnosis of somatic pain. First, the pain did not conform to any of the patterns found in musculo-skeletal disorders of the back. It was not typical of postural pain in that it did not come on with fatigue nor was it relieved by rest. Unlike the pain of osteoarthritis, it was not worse first thing in the morning nor could it be worked off with movement. Unlike the pain of disk lesions and other internal derangements of the back, it was not aggravated by bending, coughing and sneezing, or turning over in bed. The second feature of this group was that pain could not be reproduced with active or passive movements of the spine. We maintain that true somatic pain can always be produced on careful physical examination, with two exceptions: (1) where pain is due to bone disease such as metastatic carcinoma; (2) where pain is due to faulty posture, in which case the history taken in conjunction with the physical findings is diagnostic.

It will be seen that it was chiefly by a process of exclusion that pain was suspected of being retroperitoneal in origin. There was, however, one feature worthy of comment which was present in Cases 1, 2, 4, and 5. These patients complained of severe episodes of pain which came on for no apparent reason—often at rest—lasted several hours, and disappeared spontaneously. We suggest that a history of this episodic type of pain may be a useful pointer to the diagnosis of retroperitoneal backache.

(B) Pain Due to Vertebral Disease

CASE 6.—Mr. J. G., aged 23, first attended the out-patient department in April, 1953, with two months' history of low back pain of sudden onset. He had experienced a similar attack one year before, which had quickly cleared up. The pain was situated in the mid-lumbar region; it was worse on coughing and sneezing, and when the patient lay in bed at night. He was employed in a tobacco factory on work which involved bending and lifting; he found he could not do this for the last month. His general health was good and there was no loss of weight. On examination, forward flexion of the lumbar spine was found to be very limited but lateral flexion was full and painless. His E.S.R. was 11 mm. in one hour; radiographs showed narrowing of the disk space between L3 and L4

with a Schmorl's node in the body of L3 (Plate II, A). A diagnosis of prolapsed intervertebral disk was made and the patient was fitted with a surgical corset.

At review one month later he stated that his pain was much less and was present only on sudden movement. Examination revealed, however, that lateral flexion was now severely limited. Fresh radiographs were therefore taken, and these showed further disk narrowing and some rarefaction of the adjacent vertebrae. He was admitted to hospital as a case of spinal caries. Radiographs in September, 1953, showed further rarefaction and disk narrowing (Plate II, B), and bulging of the psoas shadow (Plate III) due to paravertebral abscess.

CASE 7.—Mr. M. M., an apparently fit Irishman of 32, reported on May 26, 1950, complaining of pain in his back. The onset was sudden and followed his lifting a heavy weight six weeks before. On examination he had full spinal movement, but his pain was reproduced on coughing and forward bending. There was no neurological evidence of a disk lesion, although this seemed the most likely diagnosis. When seen on July 17 he was no better. Movements of his lumbar spine were now limited in all directions by pain. A radiograph showed almost complete disruption of the right transverse process of L4. Further films showed deposits in the neck of the right femur and right scapula, and it is interesting to note that before seeing us he had experienced pain in this region but that it had quickly cleared up. Bronchial carcinoma was suspected because of a left hilar shadow on a chest radiograph, but bronchoscopy (August 24, 1950) gave negative results. Apart from the radiological changes, the only abnormal finding was an E.S.R. of 40 mm. in one hour. Radiotherapy was tried with little relief of pain.

After leaving University College Hospital the patient was investigated in another hospital, where further examinations were carried out, including barium meal and enema, intravenous pyelography, and marrow puncture. A biopsy specimen of the great trochanter was taken on March 8, 1951; the report on this was as follows: "A nodule of fibrous tissue in which there are clefts lined by flattened cells. The appearances are those of a malignant tumour: its origin is doubtful, but an intestinal primary cannot be excluded." The patient's general condition was still satisfactory, but a deposit occurred in the greater wing of the sphenoid on the right side.

He died in June, 1951, in yet another hospital. Unfortunately an autopsy was not carried out.

CASE 8.—Mr. F. M., aged 45, developed backache in December, 1952, while undertaking heavy electrical installation work out of doors. A diagnosis of "lumbago" probably due to a disk injury sustained at work was made, and this seemed to be confirmed when the pain began to radiate to the right buttock and thigh. It did not improve with ten days' rest in bed, and he was accordingly referred to hospital, where he was seen on January 16, 1953.

Examination revealed a slight lumbar kyphosis from which further flexion was markedly limited. Straight leg raising was limited to 45 degrees on the right side, with increase in pain on dorsiflexing the foot. The right quadriceps was wasted and the knee-jerk absent, but there were no other neurological signs. In view of these indications of multiple root involvement, with marked limitation of lateral in addition to forward flexion, X-ray examination was immediately

requested; this showed collapse of L4. The patient died three months later with multiple secondary deposits from carcinoma of the bronchus.

Discussion

This group illustrates the need for careful and critical review of patients whose history of onset and initial physical signs may suggest a prolapsed intervertebral disk or other internal derangement of the back. This is important even in patients responding to treatment (Case 6). Pain on lateral flexion of the lumbar spine in a young person, particularly when it develops during the period of observation, should always be regarded with suspicion and should be investigated further.

(C) Pain Due to Sacro-iliac Disease

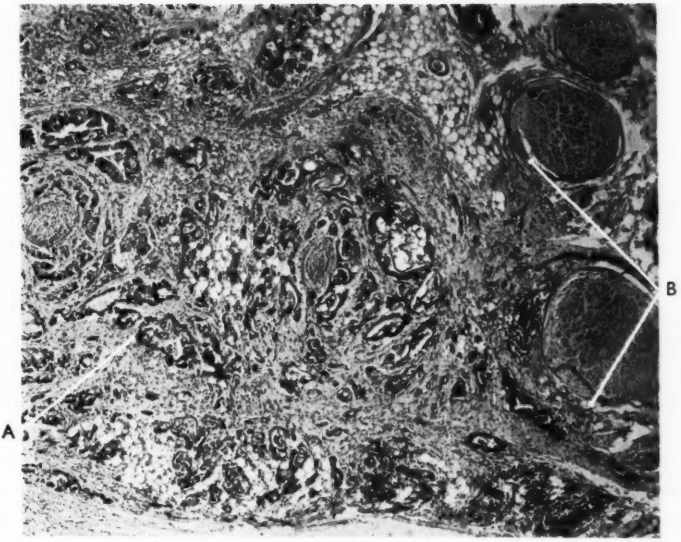
Case 9.—Miss A. G., aged 62, first attended the Department of Physical Medicine in June, 1951, with a three-months history of a dull aching pain in the left buttock. The pain, which was aggravated by movement and not relieved by rest, was worse at night. Her general health was good and she had not lost weight.

No abnormality was discovered in the spine, hips, or central nervous system, or on pelvic examination. Radiographs of the lumbar spine and pelvis were reported to be normal. Her E.S.R., however, was 27 mm. in one hour, and application of the Kromayer lamp to the site of pain in the buttock made the pain much worse. She was therefore re-examined weekly, and after an interval of five weeks tenderness was found on percussion over the left sacro-iliac joint. There were no other abnormal physical signs, but radiographs now showed some blurring and decalcification of the joint margins. Her general condition remained good. She was admitted to hospital, but despite numerous investigations, including liver biopsy, the diagnosis remained in doubt. In the ward she was thought to be exaggerating her pain. Five months later a biopsy showed destruction of the left sacro-iliac joint by secondary adenocarcinoma. The patient died in December, 1951. Autopsy revealed a primary carcinoma of the pancreas.

Case 10.—Mrs. J. T., aged 33, had suffered from severe asthma since 1947. In December, 1951, she was given ACTH for status asthmaticus, and subsequently she received maintenance doses of this drug. In May, 1952, she developed pain in her left buttock which was at first attributed to the injections; gradually, however, it increased in severity and spread to involve the thigh. By the following August she walked with a marked limp, her gait defying description. On examination she had a positive Trendelenburg sign; the only other abnormal finding was tenderness over the left sacro-iliac joint. Radiographs were normal (Plate IV, A). At the time there was a known psychological upset, and her symptoms were attributed to this. She became gradually worse, and by February, 1953, she was unable to put her full weight on her left leg; muscular wasting of the limb was present. Radiographs, however, were still normal.

She was admitted to hospital on April 10, 1953, in status asthmaticus. Although she was obviously in severe distress, she maintained that her asthma was much easier to tolerate than the pain in her hip. On further investigation she was found to have tuberculosis of the left kidney. By now the tenderness over

PLATE 1



Case 5. Photomicrograph showing (A) deposit of adenocarcinoma in posterior abdominal wall; (B) infiltration of perineurium of nerve fibres with mucus-secreting carcinoma cells.

PLATE II

A, Case 6. Lateral radiograph (April, 1953) showing narrowing of disk space between L3 and L4, and Schmorl's node in body of L3 vertebra.

B, Case 6. Lateral radiograph (September, 1953) showing further narrowing of disk space and rarefaction of adjacent vertebrae.

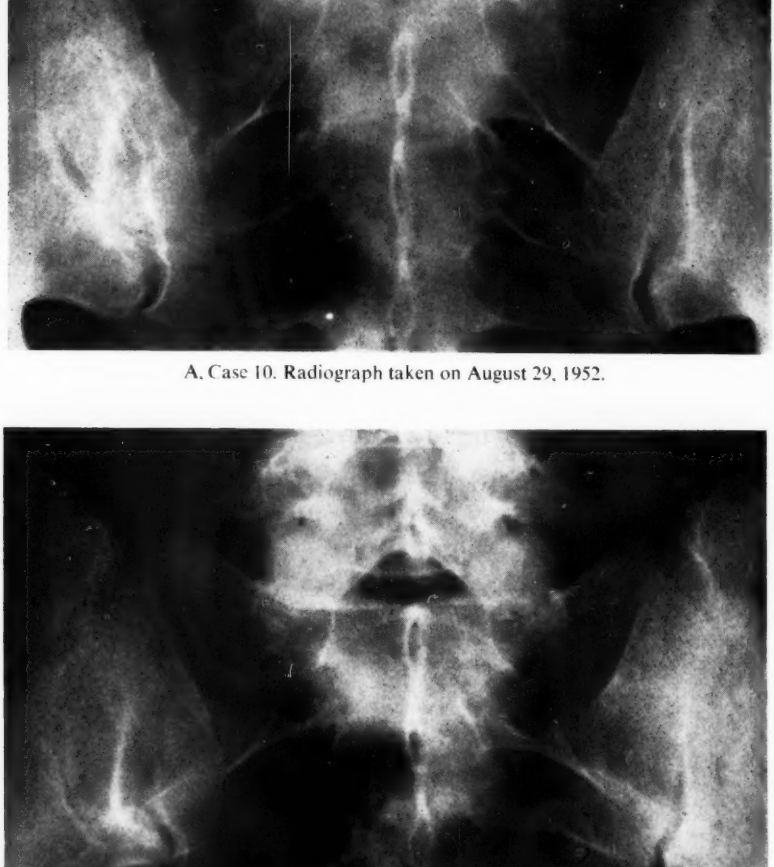
Case 6. Straight radiograph of abdomen showing bulge in right psoas shadow due to psoas abscess.

A, Case 6. Lateral radiograph (April, 1953) showing narrowing of disk space between L3 and L4, and Schmorl's node in body of L3 vertebra.

B, Case 6. Lateral radiograph (September, 1953) showing further narrowing of disk space and rarefaction of adjacent vertebrae.

PLATE IV

A. Case 10. Radiograph taken on August 29, 1952.



B. Radiograph (May 19, 1953) showing changes in left sacro-iliac joint.

the left sacro-iliac joint had increased, and pain could also be produced on left pelvic compression. Radiographs on May 19 now showed definite changes in the left sacro-iliac joint consistent with tuberculosis (Plate IV, B). A nephrectomy was performed; she was given PAS and isoniazid, and during the next six months her hip pain gradually diminished. She is now relatively symptom-free. Radiographs show no further advance of the tuberculous process in the sacro-iliac joint.

Discussion

This group illustrates the difficulties in the early diagnosis of sacro-iliac disease. In both the cases described symptoms were severe; they preceded abnormal physical signs by several weeks, and radiological changes by several months. In both cases the disproportion between symptoms and signs was such that the pain was thought to be psychogenic. Even when it was realized that sacro-iliac disease was present, it was still doubted by observers whether the pain was as severe as the patients claimed. Had it not been for the finding of a raised E.S.R. in Case 9 we should probably have discharged the patient without further X-ray examination.

Summary

1. Pitfalls in the diagnosis of backache with or without anterior radiation of pain are illustrated by consideration of 10 cases referred to a Department of Physical Medicine.

2. Of the 10 patients, 5 had pathological changes in the retroperitoneal tissues secondary to visceral disease, 3 had disease of the vertebrae, and 2 disease of the sacro-iliac joints.

3. In the first group definite evidence of visceral disease was lacking. Signs of musculo-skeletal disorder were, however, present but (*a*) pain was of a pattern different from that usually found in disorders of the musculo-skeletal system; (*b*) pain could not be reproduced on physical examination of the musculo-skeletal system; and (*c*) 4 of the 5 patients had episodic attacks of pain which came on for no obvious reason.

4. The group with vertebral disease illustrates the need for careful and critical review of all patients even when they are apparently responding to treatment.

5. In the patients with sacro-iliac disease there was a lag between the onset of symptoms and the development of abnormal physical and radiological signs.

6. When the genuineness of a patient's complaint of pain is in doubt the (reliable) evidence of someone closely acquainted with the patient is of value.

PHENYLBUTAZONE IN ARTHRITIS*

By H. RHYS DAVIES

From the Department of Physical Medicine, Mid-Herts and West Herts Hospital Group

THIS paper is based on more than eighteen months' personal experience with phenylbutazone ("butazolidin") in the treatment of arthritic conditions. At the time the investigation was started the drug was new and relatively untried in this country, although on the Continent it had been favourably reported upon by Wilhelmi (1949) and by others. As little was known of the mode of action of phenylbutazone in the human being, some caution in its use seemed necessary in view of its chemical relationship to amidopyrine.

The investigation was carried out in three stages:

1. A pilot investigation to determine if phenylbutazone was active or useful in arthritis. In 12 selected cases of rheumatoid arthritis pain was relieved and function improved in all but 2. Apart from fluid retention in 2 cases, no toxic effects were observed.
2. An experiment, with double controls, on 16 patients suffering from active chronic rheumatoid arthritis. The results are reported elsewhere (Davies *et al.*, 1952). At the same time a cautious exploration of the use of phenylbutazone in various other painful conditions was undertaken.
3. An assessment of the results of phenylbutazone administration over a long period, chiefly in rheumatoid arthritis.

It is with Stage 3 that the present paper is concerned.

Mode of Administration and Dosage

All patients were carefully observed for one month before treatment was started. The amount of pain they suffered was assessed and their response to other measures elicited; their domestic and occupational background was also inquired into.

In nearly all cases phenylbutazone was given by mouth. The initial dose was 1 g. daily for three days, then on alternate days for from two to four weeks. Thereafter the dose was reduced by one tablet (200 mg.), and maintained at this level for a fortnight. It was then further reduced until the lowest amount that maintained relief was established. The effective dose was usually found to be 800 mg. on alternate days, but occasionally 400 mg. twice weekly was sufficient. The basic dose required by any one patient may vary from time to time, apparently with the activity of the

* Based on a paper read at a meeting of the Section of Physical Medicine at the Royal Society of Medicine on June 10, 1953.

disease process. It is also possible that some patients develop a tolerance to the drug; this appears to have occurred in three recent cases which have been under treatment for over twelve months.

Precautionary Measures

Other medication, apart from iron when indicated, was avoided so far as was possible. It is thought that this may have been an important factor in increasing the safety margin. Barbiturates were particularly withheld because of the chemical relationship of phenylbutazone to amidopyrine, it having been shown by Danielopolu and his colleagues (1935) that, although barbiturates inhibit the acute toxic reactions to amidopyrine in dogs, they have no effect on the chronic toxic effects. Thus the barbiturates may mask the immediate effects of overdosage with amidopyrine. This may not apply to human beings, but it appears a wise precaution to omit barbiturates when using phenylbutazone.

Some restriction of salt intake was considered advisable; complete restriction appears to be necessary only in the elderly. A record was kept of the patient's weight during treatment; with salt restriction this does not, however, appear to vary much.

The leucocyte count, with special reference to the granulocytes, was carefully watched in the earlier cases. Frequent routine check does not appear to be necessary after the first six weeks, since agranulocytosis is usually of fairly rapid onset and gives clinical indications of its presence; most side-effects, too, are encountered within the first month or so.

Conditions Treated

Rheumatoid Arthritis

The following notes are based on a study of 160 cases of chronic rheumatoid arthritis treated with phenylbutazone. No effect of any kind was noted in 15, and since administration of the drug was not continued for more than 14 days in these cases they have not been included in the tables of results below. These cases were almost all in females. The total number of cases analysed in detail was therefore 145.

Accurate assessment of improvement is difficult in rheumatoid arthritis as (1) it is a chronic condition characterized by a varying degree of activity and a tendency to a spontaneous remission at any stage; and (2) the joints involved vary from time to time.

The independent variables most obvious clinically are: (1) the degree of joint change and the number of joints involved; (2) bodily function considered in relation to the everyday tasks which the patient must undertake; (3) the severity of the pain; and (4) the patient's sense of well-being, which is closely connected with the systemic manifestations of the disease, such as fever, lassitude, loss of weight, anorexia, and vasomotor disturbance.

1. *Effect on Joint Involvement.*—Cases have been classified (see Table I) according to the four stages suggested by the American Rheumatism Association.

Stage 1: Early. No joint destruction radiologically, but osteoporosis may be present.

Stage 2: Moderate. (*a*) Radiological evidence of osteoporosis with or without early joint changes. (*b*) Limitation of joint mobility but no deformities. (*c*) Adjacent muscle atrophy with or without nodules and tenovaginitis.

Stage 3: Severe. (*a*) Radiological evidence of cartilage destruction with osteoporosis. (*b*) Joint deformity without ankylosis. (*c*) Extensive muscle atrophy, with or without soft-tissue lesions such as nodules and tenovaginitis.

Stage 4: Terminal. Fibrous or bony ankylosis plus the criteria of Stage 3.

TABLE I

GRADING OF 145 CASES OF RHEUMATOID ARTHRITIS ACCORDING TO STAGE OF DISEASE

Before Treatment		After Treatment	
Stage	No. of Cases	Stage	No. of Cases
1	1	2	1
2	60	1 2 3	8 50 2
3	68	2 3 4	6 61 1
4	16	4	16

The first part of Table I shows the classification at the beginning of phenylbutazone therapy, while the second part shows the grading after a variable length of time on continuous treatment. The minimum period was three months and the maximum eighteen months. About 25% of the 145 patients had been receiving phenylbutazone for more than a year. The absence of any definite effect on the rheumatoid process is apparent, only 14 cases showing any improvement. Of the rest, 127 cases remained in the same grade and 4 were worse.

2. *Effect on Functional Impairment.*—In Table II the cases are grouped according to functional impairment on the basis of the classification of the American Rheumatism Association. This is as follows:

Class 1: Complete functional capacity with ability to carry on all usual duties without handicap.

Class 2: Adequate to carry on normal activities despite handicap of discomfort or limitation of movement of one or more joints.

Class 3: Able to perform only a few or none of the duties of usual occupation or self-care.

Class 4: Patients largely or wholly incapacitated, bedridden, or confined to wheel-chair; able to perform little or no self-care.

TABLE II

GRADING OF CASES ACCORDING TO FUNCTION

Before Treatment		After Treatment	
Class	No. of Cases	Class	No. of Cases
1	1	2	1
2	74	1	11
		2	61
		3	2
3	57	1	2
		2	25
		3	28
		4	2
4	13	2	4
		3	2
		4	7

Here some effect on the patient's functional capacity is apparent. About 30% (44 cases) showed improvement of one class or more, 4% (5 cases) deteriorated, while 66% (96 cases) remained in the same class. It should be emphasized that many patients were more comfortable and capable of a greater range of activities within their class, though the improvement was not great enough to warrant a higher grading.

3. *Severity of Pain.*—Analgesia is the most striking effect of phenylbutazone, and it seems likely that its usefulness in other directions is largely due to this property. Relief from pain almost always occurs within 48 hours of administration and is rarely noted if it does not occur within the first week.

4. *Sense of Well-being.*—The euphoria which occurs in many cases is difficult to evaluate, since relief from pain certainly plays some part in producing it. It is, however, this feature which distinguishes phenylbutazone from the simple analgesics; it cannot be reproduced in like degree by a combination of analgesics with D-amphetamine sulphate in full doses. The improved sense of well-being facilitates the management of these often trying and difficult cases.

Other Effects.—Three other effects of phenylbutazone appear to be worthy of mention: (1) It produces a rapid return to a normal temperature in cases where it is raised; this is maintained during therapy. (2) It appears to improve the vasomotor dysfunction in many patients, who claim that their extremities are warmer and that they are not so conscious of changes

of temperature. (3) In 3 cases with associated hay-fever the usual seasonal attacks have been less severe; in one case, indeed, no symptoms at all developed.

Failures.—In addition to the 15 cases excluded from the above tables on the grounds that phenylbutazone appeared to be quite ineffective (p. 9), a further 15 cases of the 145 considered still have sufficient discomfort to throw some doubt on the wisdom of continued therapy. These usually required full doses daily to maintain some degree of control of pain, and in all of these the drug was eventually withdrawn.

COMMENT.—Any agent possessing curative properties or capable of reversing the rheumatoid process must influence the severity of the joint changes, except where irreversible joint damage has occurred. In this series it will be seen that, though pain and the sense of well-being were the factors primarily improved, and function was sometimes improved as a direct result of relief from pain, no real evidence of any effect on the severity of the joint change was apparent.

It should be stated that phenylbutazone has not been considered to have any direct effect on the rheumatoid process, and therefore analysis of the results according to the "criteria of therapeutic response" has not been attempted. In all, 6 cases had complete remission, which so far has lasted up to eight months; the patients are back in full employment at their usual occupation. The number is probably not more than would be expected over a similar period in such a series as this.

ANKYLOSING SPONDYLITIS

Phenylbutazone proved to be of particular value in ankylosing spondylitis, especially in the early stages. Relief of pain and increased mobility of the spine were noted in 7 of 9 patients, all males. It does not appear to be necessary to continue the drug in all cases, since in 3 of these patients, perhaps during a remission, it was possible to withdraw phenylbutazone without the reappearance of symptoms or loss of mobility over periods up to five months. Breathing and back exercises were carried out in all cases. No side-effects of treatment were observed.

GOUT

Gutman and Yu (1952) report that phenylbutazone is more effective than salicylates or neocinchophen in controlling the local and systemic manifestations of acute gout. These authors state that they have used the drug to "terminate established attacks of acute gouty arthritis, to abort incipient seizures, and to suppress lingering joint pains and stiffness in chronic gout". They emphasize the simplicity of treatment and the rapidity of subjective relief, and consider the dangers of "short-term" treatment to be minimal.

Kuzell *et al.* (1952) report complete remission within 48 hours in 25

of 48 cases of acute gout; in another 15 cases signs and symptoms decreased rapidly, but in the remaining 8 cases the response was not marked.

In the present series 4 cases of classical acute gout were rapidly relieved. In 2 of these the attack was completely aborted by the intramuscular injection of 1 g. of phenylbutazone. Two cases of chronic tophaceous gout showed a similar, if slower, response during exacerbations.

Osteoarthritis of the Hip

Thirty cases of osteoarthritis of the hip have been treated with phenylbutazone; the results are given in Table III, classified according to the type of pain relieved. About 25% had involvement of both hip-joints as shown on X-ray examination; the average duration of symptoms was 2·7 years.

TABLE III

Results of Treatment in 30 Cases of Osteoarthritis of Hip

Type of Pain	Degree of Relief			
	None	Partial	Marked	Complete
"Weight-bearing" pain	2	14	14	—
Night pain*	2	3	16	5

* Four patients had virtually no night pain.

It will be seen that nocturnal pain tends to be relieved to a greater extent than the more usual weight-bearing pain. About half the patients experienced a marked degree of relief. No effect was noted in 2 cases.

Osteoarthritis in other joints does not appear to be relieved to the same extent. In 4 cases in which the knees were affected relief was not marked, and since other, safer methods are available, the use of phenylbutazone was not continued.

Other Conditions

Cervical Osteoarthritis.—Pain due to degenerative changes in the cervical spine, when not relieved by other means, often responds well, an increase in the range of movement usually being obtained. In most cases it has been possible to withdraw phenylbutazone after a fortnight without return of pain.

Lumbar Osteoarthritis.—Low back pain associated with degenerative changes in the lumbar spine shows a variable degree of response. Of 18 patients treated, almost complete relief within twenty-four hours was noted in 2 and some relief in 9; in the remaining 7 there was no effect. On the whole, phenylbutazone therapy appears not to be indicated in low back pain of this type except in full doses for three days in the form of a brief trial.

Periarthritis of the Shoulder associated with chronic pain, limitation of movement, and muscle atrophy often responds well to treatment with

phenylbutazone. It does not appear to be necessary to continue administration for more than fourteen days, but measures to restore mobility are usually required for a much longer time. *Acute bursitis* responds equally well as a rule; and in this condition also it is necessary to give the drug for only a short time.

Paget's Disease of Bone.—Of 5 cases of osteitis deformans with involvement of the hip-joint treated with phenylbutazone, pain was markedly relieved in 3.

Side-effects

The complications of treatment with phenylbutazone may be considered under several heads. It is not always possible to draw a clear dividing-line: some side-effects may be due to toxicity of the drug (i.e. the effects of continued overdosage) and some to intolerance (i.e. toxicity in a particular case), while others might more correctly be regarded as allergic phenomena.

1. *Allergic reactions* occurred in 14 cases. In 8 cases drug rashes of an erythematous or morbilliform type developed; these subsided uneventfully. Three patients had angioneurotic oedema, which disappeared rapidly without causing anxiety; the thigh was involved in one case, the face and floor of the mouth in the other two. Three further patients experienced dyspnoea of a mild degree without physical signs, possibly a minor form of asthma. None of the above cases appeared to respond to antihistamine drugs.

2. *Idiosyncrasy or toxic effects.*

(*a*) Gastro-intestinal upsets of varying degree were noted in 20 cases. Details are as follows: gastric symptoms occurred in 10 cases, 6 of which had dyspepsia. In 4 cases an old peptic ulcer was reactivated; in one of these perforation took place and in another melaena developed. Intestinal symptoms occurred in 7 cases but were not severe, 4 having transient diarrhoea and 3 persistent loose stools when taking the drug. Two patients lost their sense of taste, but this returned in fourteen days without its being necessary to stop treatment. Anorexia apparently due to phenylbutazone occurred in one case; it persistently disappeared on withdrawal of the drug.

(*b*) Granulocytopenia was noted in one case after three months' treatment. The granulocyte count rose to normal within one week of stopping administration of the drug, and treatment was resumed.

(*c*) Purpura has occurred on two occasions without change in blood and platelet counts or in bleeding and coagulation times. It appears to have been due to increased capillary permeability.

(*d*) Fluid retention precipitated cardiac failure in 3 cases, 2 of which responded rapidly to the usual measures following withdrawal of phenylbutazone. The third patient, a male aged 74, died within three days.

(*e*) Two patients with advanced rheumatoid arthritis have sustained a fracture of the femoral neck while receiving phenylbutazone. In each case insufficient pain was felt by the patient to give full warning of the occurrence. In one of the cases the fracture occurred when the patient turned over in bed, and in the other when walking, without definite trauma. The second patient continued ambulant for one week after the incident. Increased freedom of movement due to analgesia was probably an important factor here.

(*f*) In addition to the fatal case referred to above, a second death, the cause of which is not known, occurred in the series. This is reported in detail elsewhere (Davies *et al.*, 1952).

Summary and Conclusions

Phenylbutazone has proved a most useful adjuvant in the management of arthritic conditions. It should not, however, be regarded as more than ancillary to other measures of proven value such as rest, physical treatment, and, when indicated, chrysotherapy; in fact, its use is permissible only when these measures have failed.

The main indications for using the drug are rheumatoid arthritis, ankylosing spondylitis, and gout. Osteoarthritis of the hip is another indication, particularly when night pain is distressing; in such cases, however, the patient's age and general condition often preclude its use.

The widespread use of this preparation before the long-term toxic effects are known demands continual watchfulness.

Acknowledgment

I am indebted to Messrs. Geigy Laboratories Ltd. for generous supplies of phenylbutazone ("butazolidin").

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CITRATE IONTOPHORESIS IN RHEUMATOID ARTHRITIS OF THE HANDS

By ANTHONY B. COYER

From the Department of Physical Medicine, St. Thomas's Hospital, London

IT is characteristic of the rheumatoid type of arthritis that patients have repeated exacerbations of pain, tenderness, and swelling with restricted movements of the small joints of the hands. The physical methods generally used in the treatment of these attacks are disappointing; they include wax baths and other forms of heat therapy, together with administration of analgesics. Movements of the affected joints are encouraged as soon as possible, the aim of treatment being to regain maximum joint function with a minimum of deformity.

The aetiology of rheumatoid arthritis is still obscure. To explain the acute condition of affected joints and tissues many hypotheses appear to invoke an allergic or similar mechanism derived from an antigen–antibody reaction subsequent to infection or other stimulus. The evidence for this is discussed at length by Fletcher (1951). Collins (1949) had previously suggested that the joint lesions might be due to a combination of hypersensitivity and metastatic bacterial infection.

Bordet (1913) originally developed the idea of allergy based on an "anaphylatoxin" produced in the blood stream, which led to the "humoral" theory of anaphylaxis. At about the same time Dale (1913) developed the theory that anaphylaxis was due to the reaction of an antigen with its specific antibody anchored in the tissues. Later he (Dale, 1920) postulated that histamine was released by a combination of antibody and antigen at the cell surface. Dale's conception of the mechanism of anaphylaxis became known as the "cellular" theory. More recently Rocha e Silva (1952) has shown that these theories of anaphylaxis fitted in with his own observations on provoked anaphylaxis in animal experiments. He demonstrated that in allergic and anaphylactic reactions clumps of leucocytes and platelets are formed in the capillaries and small blood vessels; disintegration of these microthrombi quickly follows and is accompanied by the release of histamine-like substances. He also showed that the agglutination could be prevented by using citrate as an anticoagulant. Rocha e Silva further studied the effects of local application of citrate upon several kinds of dermatitis of allergic origin, and claimed good results from this treatment.

Preliminary Considerations

The present investigation was based on the argument that, if improvement occurred with citrate application in one allergic disease, its use in another disease of similar nature might be successful. Iontophoresis of the

citrate ion through the skin seemed to be indicated in order to obtain a high local concentration of citrate, especially in the interphalangeal and metacarpophalangeal areas, where only a millimetre or two of tissue has to be traversed. There are further advantages in citrate iontophoresis: (1) it is possible to introduce the citrate direct into the involved region of the body without loss or alteration of the drug due to metabolism; and (2) iontophoresis creates a deposit of citrate from which systemic absorption is relatively slow and prolonged.

In the past considerable doubt has existed concerning the depth of penetration of ions introduced through the skin by iontophoresis. Recently, however, Oester and O'Malley (1953) have adduced evidence of deeper penetration and distribution of ions by this method in rats. In the case of methylene blue, for instance, post-mortem study revealed that the dye had penetrated the tissues in the region of the "driving electrode" to a distance of about 1 cm.; in addition it had stained the underlying bone.

The above considerations left little doubt that the introduction of citrate by a direct current would be limited to the parts immediately contiguous to the surface of the skin and mucous membrane where such a solution of ions might be applied. It was considered likely that the close proximity of the small joints of the fingers and hand to the skin surface would allow many of the applied "ions" to reach the periarticular tissues, and thus the area of the rheumatoid process.

Method

Only those patients were selected for treatment who were suffering from rheumatoid arthritis and had an acute exacerbation in the small joints of the hand characterized by pain, swelling, tenderness, and restricted movement of the fingers. The patients, whose ages varied between 26 and 80 years, were divided into three groups without discrimination, the first group (15 patients) being treated by citrate iontophoresis, the second (10 patients) by anodal galvanism, and the third (10 patients) by cathodal galvanism. The last two groups, intended for comparison, were treated by electrical methods so that the psychological factor of treatment should be the same in all cases, and also to forestall criticism on the grounds that the electrical current, as distinct from the action of the citrate, was responsible for the results.

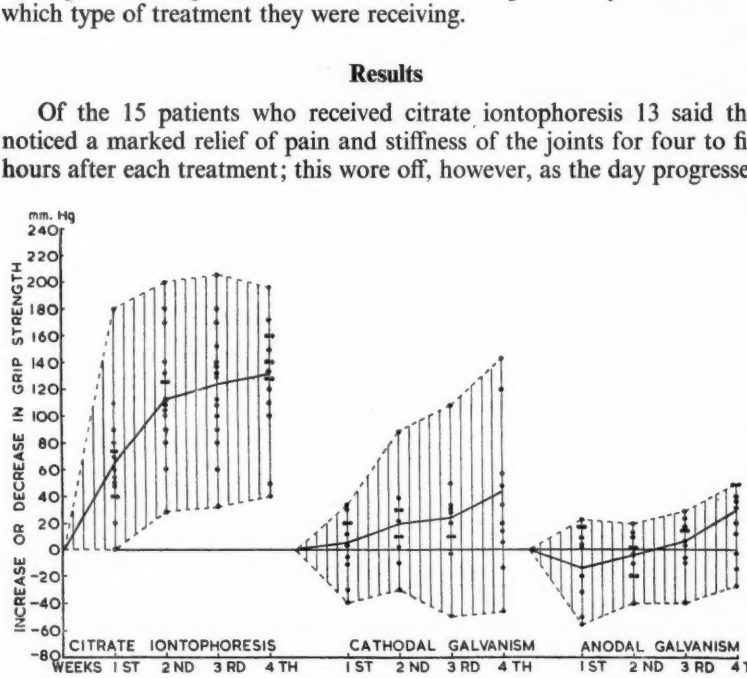
The citrate iontophoresis was administered in a cathodal bath containing a 2% solution of potassium citrate in distilled water at room temperature. The patient's hands were immersed in the container and a current of approximately 10 milliamperes was passed for twenty to thirty minutes. The indifferent electrode was applied to the mid-scapular area.

The same routine was used for patients treated by anodal and cathodal galvanism, but the container held tap water instead of citrate solution. The average current strength used was 20 milliamperes.

Patients were treated every other day for four weeks, and visited the clinic at weekly intervals for assessment. On each occasion the grip strength of the hands was tested by means of a rubber-bulb ergometer. The patient was asked to squeeze the bulb as hard as possible with each hand separately, the ergometer reading being noted. Three successive grips were observed and the average was recorded. Patients were questioned as to subjective changes in movement and relief of pain. They did not know which type of treatment they were receiving.

Results

Of the 15 patients who received citrate iontophoresis 13 said they noticed a marked relief of pain and stiffness of the joints for four to five hours after each treatment; this wore off, however, as the day progressed.



Graphs comparing the effect on grip strength in patients receiving citrate iontophoresis treatment with that in the control groups. The broken lines show the range of "scatter" for individual patients, who are indicated by dots. The continuous lines record the averages.

Five of the 15 patients noticed a slight erythematous rash on the hands after treatment; this did not irritate, and disappeared within twenty-four hours. Of the 20 patients receiving plain galvanism, 18 said that they felt little or no relief at any time. Six of this latter group considered that there was more pain and swelling of the fingers.

Measurements of grip strength obtained at weekly intervals were averaged for each of the three groups of patients, initial grip strengths before treatment started being reckoned as zero. The results are given in the accompanying graphs, which show the much greater improvement in

grip strength in patients treated with iontophoresis as compared with the controls.

Discussion

That the series of cases studied is small is due to the need to restrict the investigation to those patients with recognized rheumatoid-type arthritis who had sudden acute exacerbations of pain and stiffness in the small joints of the hands. Of the patients who benefited from treatment with citrate iontophoresis, a number suffered from relapses after treatment ceased, whereas in others the improved joint movements and relief from pain were maintained. While there is no suggestion that this method of treatment is a panacea for acute inflammation and stiffness of the small joints of the hands, it appears to offer prospects of clinical improvement in these cases. It is noteworthy that 8 of the patients whose condition improved with citrate iontophoresis had previously received wax and local heat treatment without any relief from pain or stiffness.

The other two groups of patients treated by anodal and cathodal galvanism respectively showed very little improvement over a period of four weeks of treatment.

Summary

1. Fifteen patients with a relapse of their rheumatoid arthritis were treated with citrate iontophoresis to the hands.

2. During treatment temporary relief of pain and steady improvement in grip strength were noted.

3. Two control groups of 10 similarly affected patients treated with cathodal and anodal galvanism respectively showed little or no improvement.

4. The rationale of the treatment is discussed.

Acknowledgments

I am indebted to Dr. P. Bauwens, Physician in Charge of the Department of Physical Medicine, St. Thomas's Hospital, for encouragement and advice in the preparation of this paper; also to my colleagues in the Department for criticism and help.

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CLINICAL REPORTS

DEMONSTRATION OF CASES BEFORE THE BRITISH ASSOCIATION OF PHYSICAL MEDICINE

A CLINICAL meeting of the Association was held in the Department of Physical Medicine, University College Hospital, London, on April 17, 1953. Cases were presented and various orthopaedic appliances demonstrated by DRS. W. D. FLETCHER, D. A. KININMONTH, and S. MATTINGLY.

1. Clinical Cases

Leprosy: Two cases were shown. The first, in a male aged 19, was admitted in September, 1951, for investigation of a rash; a diagnosis of leprosy was established by skin biopsy. He was seen in the Department of Physical Medicine six months later because of bilateral ulnar and median palsies, and left foot-drop due to anterior tibial palsy. The latter improved with the aid of an appliance, which was later discarded. The left hand improved spontaneously, but the right made no progress and the question of surgery was being considered.

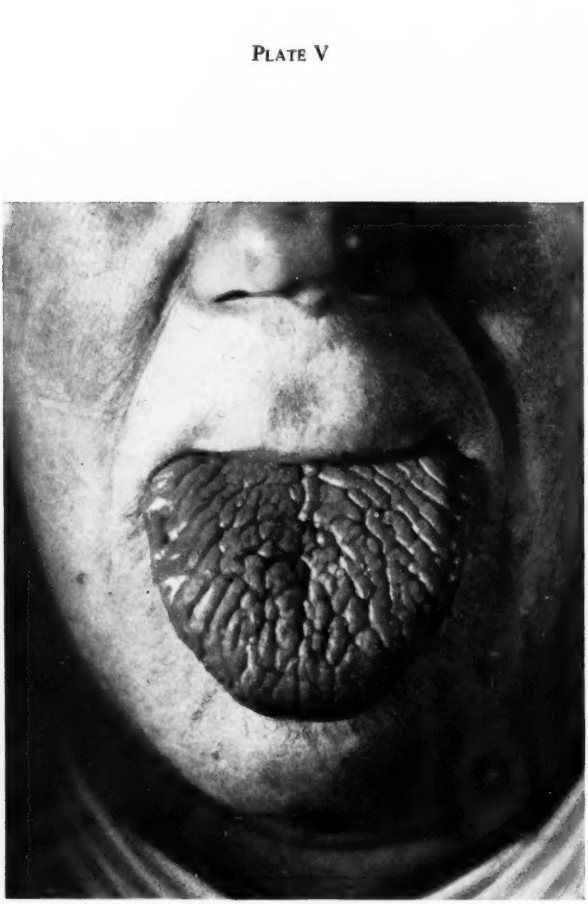
The second case, in a male of 27 with a six-years history of leprosy, presented locomotor problems due to (1) severe widespread scarring involving both hands, and (2) neuromata of both ulnar nerves. The neuromata caused severe pain of ulnar distribution on both sides. The right subsided spontaneously, but the left required procaine block for relief.

Ankylosing Spondylitis: A male aged 52 with a history of low back pain since 1943 first attended hospital in 1948. After full investigation [including E.S.R. (15 mm.)] a diagnosis of "an old disk lesion with functional overlay" was made; his symptoms improved with physiotherapy. In 1952 he returned to hospital because of increased pain and stiffness in the back. All spinal movements were limited; E.S.R. was 26 mm.; radiographs were reported to show tuberculous arthritis. A diagnosis of ankylosing spondylitis was strongly suspected, but in view of the radiographic report and a history of tuberculous arthritis of the ankle in childhood, radiotherapy was withheld and the patient kept under observation.

In March, 1953, he developed acute conjunctivitis, his backache became worse, and the E.S.R. rose to 40 mm.; oblique radiographs of the lumbar spine showed involvement of the apophysial points. A firm diagnosis of ankylosing spondylitis was now made and the patient referred for radiotherapy. A good series of radiographs showing gradual involvement of the sacro-iliac and apophysial joints was shown.

Phenylbutazone ("Butazolidin") Toxicity: A man of 52 with a history of rheumatoid arthritis since 1937. Since the onset of the disease he had

PLATE V



Glossitis and aptyalism following phenylbutazone therapy

received many forms of treatment, including several courses of gold, without toxic manifestations. On January 28, 1953, he was prescribed phenylbutazone (200 mg. twice daily); he was at this time on a fortnightly maintenance dose of 0·05 g. of "myocrisin". When seen on February 25 he reported that during the previous week his mouth had become increasingly dry; there was now complete absence of saliva; the tongue was beef-red in appearance, sore, and furrowed. (See Plate V.) There was a diffuse submandibular swelling which was not tender. The leucocyte count was 8,200 per c.mm. Gold and phenylbutazone treatments were discontinued.

On March 25 the tongue was considerably less painful and saliva was present in small quantities.

Myotonia Congenita: A man of 52 with classical symptoms and signs and typical electromyographic findings of myotonia in the upper and lower limbs. Relaxation time curves showing the effects of exercise were demonstrated, and the chromatographic findings were discussed.

Psoriasis Arthropathica: This case has already been described in detail (see Mattingly, *Ann. phys. Med.*, 1953, **1**, 264).

2. Orthopaedic Appliances and Aids

Leather Hip Spica: For relief of pain in an osteoarthritic hip-joint which had formerly failed to respond to physiotherapy, procaine injections, deep X-ray therapy, and manipulation. Unfit for surgery.

Block Leather Ankle Support: For relief of a painful ankle-joint in a patient suffering from pernicious anaemia and subacute combined degeneration of the cord. Sensory loss due to latter prevented adequate physiotherapy.

Below-knee Calliper with Hinged Ankle-joint: To prevent inversion and eversion of foot, and therefore abolition of pain arising in subtaloid joint, as result of rheumatoid arthritis.

Opponens Splints: The Napier and Cholmeley types were shown. The latter has been of value in management of osteoarthritis of trapezio-metacarpal joint.

Splint for Weight-resisted Quadriceps Exercises: A simple aluminium splint from which weights can be suspended was shown. The technique of weight-resisted exercises was elaborated and attention drawn to their value.

D. A. KININMONTH

NEW APPLIANCES

FINGER SPLINT FOR CORRECTING DEFORMITY

THE finger splint here described was originally designed to correct the deformity resulting from Dupuytren's contracture. The splint itself is made of "perspex" so that it can be moulded to suit the individual needs of the patient, and holes are drilled in it to keep down weight and to allow for ventilation. The correction ferrule or ring is of aluminium tube with a protective lining of "zopla" felt.

When the splint is in use, graduated pressure is applied by clockwise turning of the rubber-tyred wheel nut, which turns on a fixed threaded rod forming part of the ferrule.

The splint and its application are well illustrated in Plates VI and VII.

This appliance was designed and made in the Occupational Therapy Department of St. Thomas's Hospital, London.

P. BAUWENS

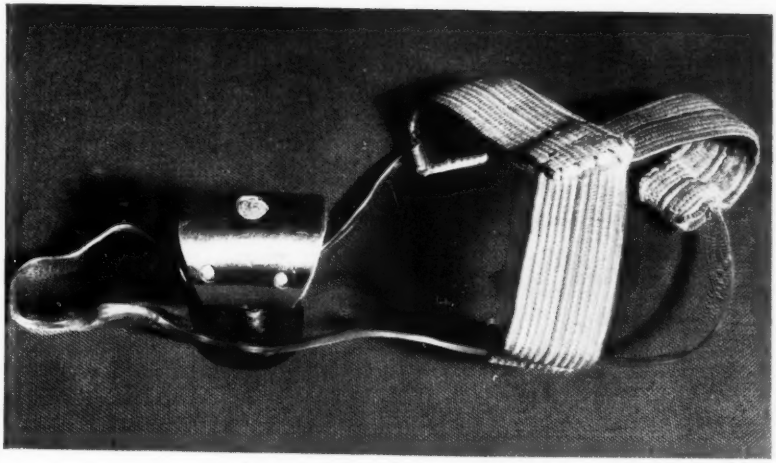
Department of Physical Medicine,
St. Thomas's Hospital.

COMBINED BED CRADLE AND FOOT-EXERCISE PLATFORM

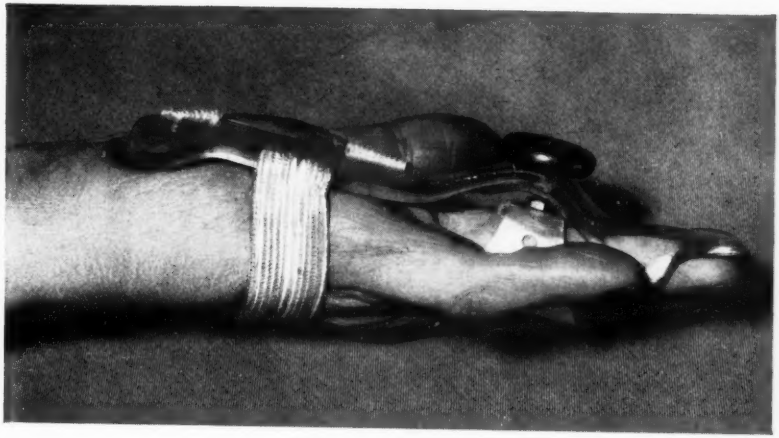
DURING the past few years increasing attention has been paid to the position of the feet and legs of patients in bed. This is particularly necessary with long-stay patients, in whom contractures of the feet and knees are prone to occur. With this in mind a combined bed cradle and foot-exercise platform has been designed with the object of keeping the lower limbs in good position and at the same time permitting the performance of simple exercises. (See Plate VIII.)

Construction

The appliance is fixed to the bed by two clips, which are readily detachable and have been designed to fit either tubular or angle iron bed side-members. To these clips are welded short lengths of steel tube, so that when in position the tubes are held rigidly at right angles to the bed side-member and perpendicular to the floor. Into these side-tubes a cross-tube slides easily. The latter passes over the mattress and bottom sheet, and has a sliding section to allow for minor variations in bed width. To the cross-member is welded a bent steel tube which forms the framework of a rigid bed cradle. Close to the lowest point of the bed cradle a second bent tube is mounted by means of bolts. This forms the framework for the attachment, by means of three bolts and wing nuts, of a plywood platform 24 inches wide and 12 inches high. Two sets of springs, of variable



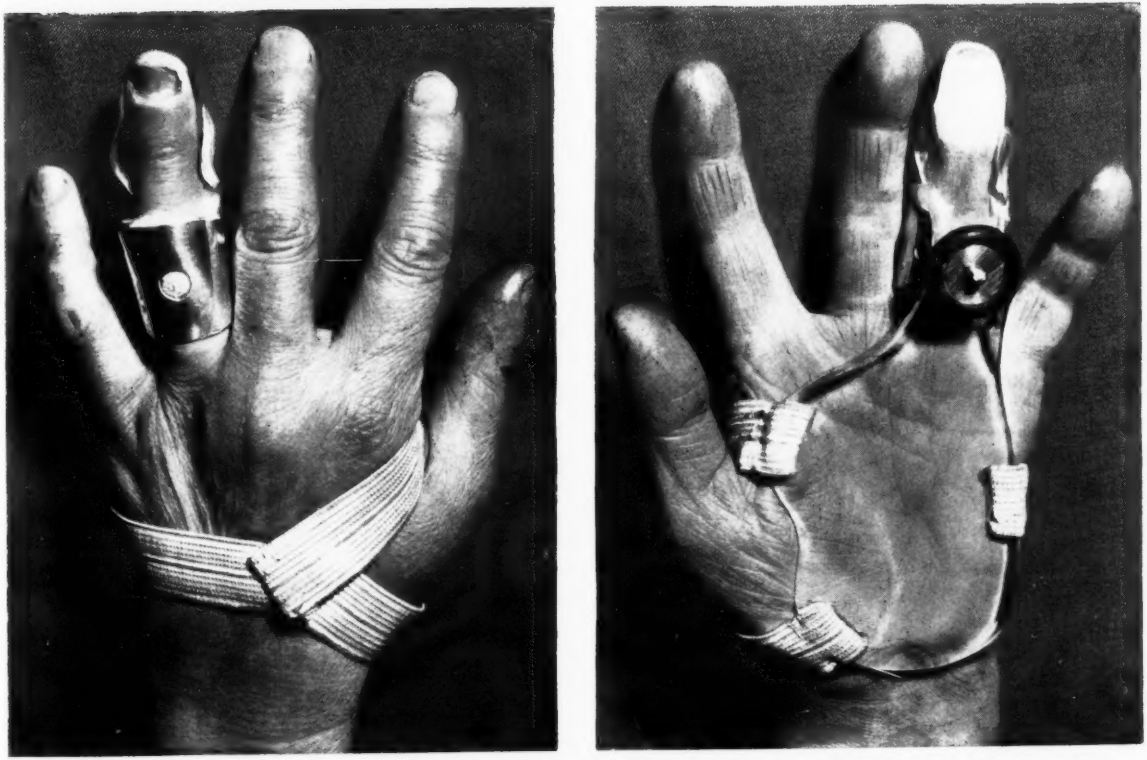
Finger splint for correcting deformity.



Finger splint applied.

P.B. face p. 22]

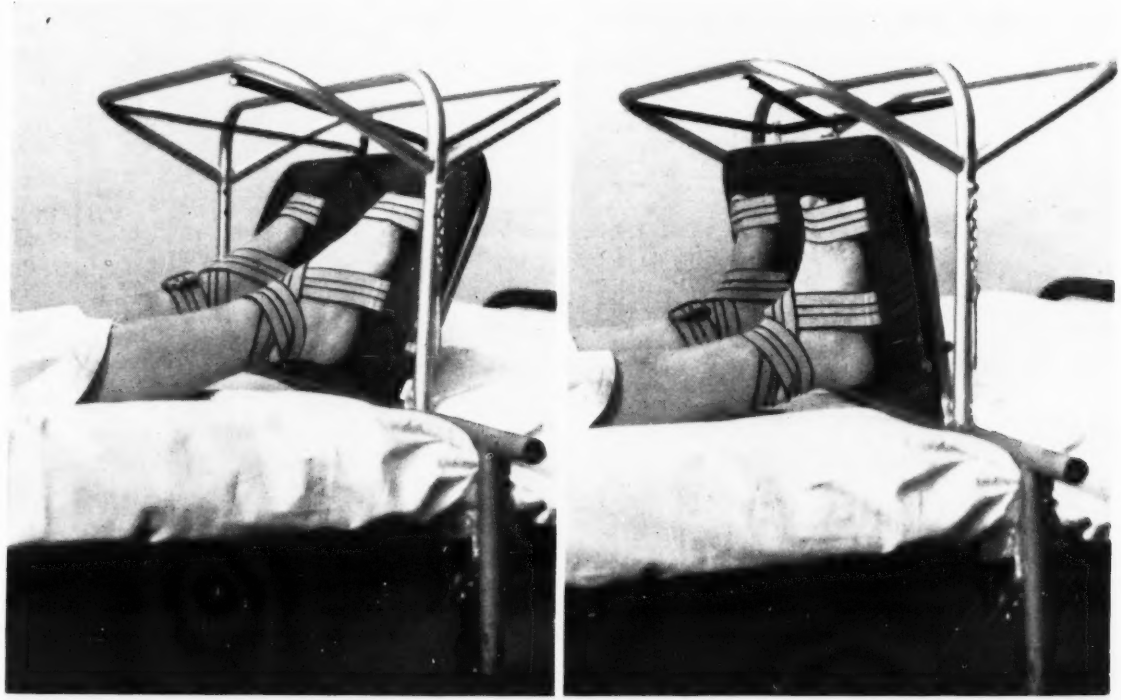
PLATE VII



Back and front views of splint in use.

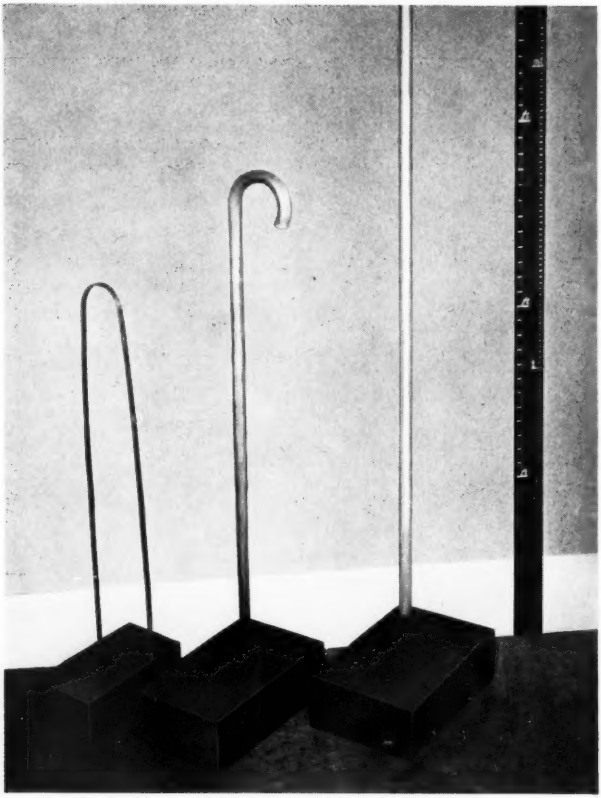
PLATE VIII

Back and front views of splint in use.



Combined bed cradle and foot-exercise platform.

PLATE IX



Showing the "half-step" with three different attachments.

(*R.H. face p. 23*

tension, mounted between the movable platform and the rigid cradle allow resisted exercises to be performed. The platform may be locked to the cradle by means of pins passing through the framework of the cradle and the platform-supporting framework.

Application

Either dorsiflexion resisted exercises or plantar-flexion resisted exercises may be given. For the performance of dorsiflexion resisted exercises the foot may be secured to the platform by simple webbing straps and buckles which pass through slots cut in the platform. One set of straps passes over the forefoot proximal to the metatarsal heads, and a second strap, in a figure-of-eight formation, round the ankle-joint and through slots in the platform at a point opposite the tips of the malleoli. Should the resistance to exercise prove too great, a spring may be readily removed or one of weaker tension substituted.

Where it is necessary to keep the foot in one position the patient should wear sock and shoe as a protection against pressure sores from the straps. Where painful or ulcerated heels are a nursing problem, it has been found helpful to suspend the legs in simple slings attached to the upper cross-bar of the cradle. For this purpose the plywood platform is removed and the cradle mounted on the bed at a point opposite the middle of the calf.

The appliance can be easily slid out of the specially designed side-members for bed-making, etc.

This bed cradle and foot-exercise platform was designed in the Department of Physical Medicine and Rehabilitation at Swindon and made by Messrs. Spencer Harris, Engineers, of Cirencester, who have given much useful help in its construction.

J. B. STEWART
Consultant in Physical Medicine, Cirencester, Pewsey, and Swindon Hospital Management Committees.

THE "HALF-STEP" OR PORTABLE STAIRCASE

GETTING up and down stairs presents a major problem to arthritic patients with ankylosed hips or knees. The standard household staircase has a step rise of between $6\frac{1}{2}$ and $7\frac{1}{2}$ inches, and this is beyond the ability of many arthritics to accomplish by pelvic hitching or tilting.

Instruction in negotiating stairs forms a necessary part of the rehabilitation of patients crippled with arthritis, and in our department three different step rises—$4\frac{1}{2}$, 6, and $7\frac{1}{2}$ inches—are available for this purpose. It was found that patients with movements grossly restricted as a result of arthritis could be taught to master the $4\frac{1}{2}$-inch rise without too much difficulty, and that a few could even manage the 6-inch step; they were unable, however, to cope with a normal staircase.

face p. 23

To help these patients to become independent the portable "half-step" was developed. This consists of a box made of half-inch softwood and fixed to a walking-stick, pole, or metal strip (see Plate IX). The box is $3\frac{3}{4}$ inches high and of a width and length just sufficient to allow both feet to stand comfortably and firmly on it. Suitable dimensions are $3\frac{3}{4} \times 7 \times 12$ inches; the total weight is under 3 lb.

In climbing a normal staircase the "half-step" is brought up to the first step by the patient and mounted with both feet. The tread of the step is now only $3\frac{3}{4}$ inches above that of the "half-step". The first step is now climbed. The portable "half-step" is then lifted on to the first step, and so on until the head of the stairs is reached. The same procedure is followed in reverse in descending a staircase.

This simple piece of apparatus, which was developed and produced by Mr. F. Coulthurst, M.Inst.M.M., M.Coll.H., in the carpentry section of the Occupational Therapy Department, works well in practice, and patients quickly become adept in its use.

R. HARRIS

Rehabilitation Unit, Devonshire Royal Hospital, Buxton.

LIGUE INTERNATIONALE CONTRE LE RHUMATISME

EIGHTH INTERNATIONAL CONGRESS, GENEVA, 1953

THE Eighth International Congress of the Ligue contre le Rhumatisme was held at Geneva from August 24 to 28, 1953. One of the days was spent at Aix-les-Bains. Over 1,000 members enrolled for at least part of the Congress and 173 scientific papers were read. On the day before the opening of the Congress there were meetings of the International and European Leagues.

Scientific Programme

Five main topics were discussed at the scientific sessions: connective tissue, steroid hormones, phenylbutazone ("butazolidin"), surgery of osteoarthritis of the hip, and rehabilitation. In addition a number of free papers were read.

Connective Tissue

J. H. KELLGREN (Manchester), on the basis of isotope studies in rats using C^{14}-labelled glycine, concluded that there was very little collagen turnover in adult tissues.

The Scandinavian workers, among whom were N. SVARTZ (Stockholm) and G. TEILUM (Copenhagen), reported 70 to 95% of positive immunity reactions with sensitized sheep red cells in rheumatoid arthritis.

Steroids

T. REICHSTEIN (Basle) announced that a crystalline compound, electrocortin, had been isolated from the amorphous fraction of the adrenal cortex. This substance was likely to have marked effects on electrolyte metabolism.

P. S. HENCH (Rochester, Minnesota), in a masterly review of the present state of hormone therapy, emphasized the importance of "tailoring the dose" to the requirements of each individual. He also pointed out that too high (as well as too low) doses might give rise to increased symptoms.

In a session on intra-articular hydrocortisone J. L. HOLLANDER (Philadelphia) reported on the results of over 10,000 individual injections into rheumatoid arthritic and osteoarthritic joints. R. H. FREYBERG (New York) reported on over 200 patients. Injection of hydrocortisone was generally agreed to be a useful measure in rheumatoid arthritis, but relatively unsuccessful in osteoarthritis. G. D. KERSLEY (Bath) found no benefit in osteoarthritis as compared with procaine, but found it of considerable assistance in correction of deformity with manipulation in rheumatoid disease.

Ligue Internationale contre le Rhumatisme

Phenylbutazone

From a large number of papers it emerged that phenylbutazone was of value in gout, spondylitis, and rheumatoid arthritis (in that order). The toxic effects were fully discussed.

Osteoarthritis of the Hip

J. and R. JUDET (Paris) analysed the results of 500 operations using the acrylic head and carefully reviewed the failures (35%).

R. MERLE D'AUBIGNÉ (Paris) advocated the use of a prosthesis which replaced the neck as well as the head of the femur. This operation was preferable to the Judet prosthesis, particularly in cases with a shortened femoral neck.

Rehabilitation in Rheumatoid Arthritis

W. S. TEGNER (London) stressed the importance of early rehabilitation.

HOWARD RUSK (New York) reported the result of rehabilitation, combined in 50% of cases with cortisone, in 43 patients. Restoration to completely independent status was achieved in 30%.

M. THOMPSON (Newcastle) and J. J. R. DUTHIE (Edinburgh) gave a valuable statistical analysis of pre-hospital, post-hospital, and two-year follow-up assessment. In hospital the most frequent result was reduction in activity of the disease, and after-treatment consolidated the improvement mainly from the point of view of function.

Free Papers

Among the "free papers" R. SMITH (Philadelphia) described the long-term use of "benemid" (probenicid) in gout. The drug was non-toxic even after three years' continuous administration. The best dosage was 0·25 g. twice daily, rising to twice this dose, the urine being slightly alkalinized with sodium bicarbonate. Also on the subject of gout L. M. LOCKIE (Buffalo), using tracer elements, defined the normal uric acid pool as 800 to 1,400 mg. with a turnover of 0·5 to 0·9% per day. In gout the pool was much greater and the percentage turnover less.

Personal Impressions

Perhaps the most impressive feature of the Congress was the zest with which members threw themselves into both the work and the play. The Swiss Committee, under the chairmanship of Professor Walthard, was untiring. Despite the number of official celebrations the three conference halls were well filled throughout.

New features were the medico-scientific and trades exhibitions, both of which were of considerable interest.

G. D. K.

WORLD CONFEDERATION FOR PHYSICAL THERAPY

FIRST CONGRESS, LONDON, 1953

THE first Congress of the World Confederation for Physical Therapy took place in London from September 7 to 12, 1953, under the Presidency of Miss Mildred Elson (U.S.A.). The organization was in the hands of a special Congress Committee set up by the Chartered Society of Physiotherapy. Over sixteen hundred delegates from twenty-five countries participated. From its opening on the Monday morning by the Minister of Health, Mr. Iain Macleod, to its close on the Friday evening with a banquet and ball at the Park Lane Hotel the Congress was an unqualified success.

Six main sessions were devoted to lectures followed by discussions on the relation of physical therapy to (1) neuromuscular disorders, (2) rheumatic diseases, (3) diseases of the chest, and (4) industry. In addition one main session was devoted to papers by physical therapists on treatment and research. In all, nine doctors and nineteen physical therapists took part in these sessions, which were held at the Central Hall, Westminster. Films were also shown. On two afternoons visits were paid to twenty-five hospitals, clinics, and rehabilitation centres in and around London. In the evenings there was a full social programme for the delegates.

Other features of the Congress were the Scientific and Trade Exhibitions. In the scientific exhibition the Central Council for the Care of Cripples, the British Red Cross Society, the Canadian Department of Veterans Affairs, the Association of Occupational Therapists, and hospital departments in this country demonstrated a large number of devices for the disabled. In the trade exhibition, in which many firms took part, much new physiotherapy equipment was shown.

The organization of an International Congress is not a task to be lightly undertaken. This is especially so when a Congress is the first of its kind and therefore likely to set the standard for the future. The undoubted success of the London meeting, to which all testified, reflects greatly to the credit of the British organizing committee, in particular to its chairman, Professor Whillis, and its indefatigable secretary, Miss Neilson.

H. A. B.

ABSTRACTS OF THE LITERATURE

Effect of Electrical Stimulation upon Blood Flow and Temperature of Skeletal Muscle. B. F. RANDALL, C. J. IMIG, and H. M. HINES. *Amer. J. phys. Med.*, 1953, **32**, 22.

The gastrocnemius muscles of anaesthetized dogs were stimulated with a commercial electrotherapy apparatus, slow surging and tetanizing currents being used. Blood flow was measured electromagnetically in the cannulized femoral artery. Electrical stimuli were applied for from one-half to one and a half minutes. There was a considerable increase in blood flow during and immediately after stimulation which could not be explained on the basis of temperature rise, which seldom exceeded 1° C. The authors attribute increased blood volume to the vasodilating effects of metabolites associated with muscle contraction.

It is apparent from these studies that there has been justification for the empirical use of electrical muscle stimulation in some reversible pathological conditions of muscle as used during the period of Duchenne to Morton Smart.

SIDNEY LICHT

The Use of Electromyography in the Study of Clinical Kinesiology of the Upper Extremity. G. G. HIRSCHBERG and M. M. DASCO. *Amer. J. phys. Med.*, 1953, **32**, 13.

Electromyography is of value in the study of kinesiology because (1) muscle contraction always produces action potentials, and there are no action potentials without muscle contraction; (2) the time relationships are accurate; (3) the potential strength is related to the force of muscle contraction; (4) simultaneous recording of several muscles is possible; and (5) an immediate and permanent tracing is available. It has two shortcomings: (1) with skin electrodes only the superficial muscles are studied; and (2) the relationship between strength of contraction and potential developed is only approximate. The authors employed a multichannel pen-writing oscillograph with small skin electrodes such as are used in electroencephalography.

SIDNEY LICHT

Resistive Exercises in the Treatment of Poliomyelitis. D. A. SCHRAM. *Arch. phys. Med.*, 1952, **33**, 549.

The author describes the use of resisted exercises in the rehabilitation of poliomyelitis patients, and follows this with a description of devices for assisting weak muscles. Weak calf muscles can be assisted by means of a half-inch elastic band attached from mid-thigh to the heel on a long-leg walking calliper. Tension is arrested when the leg is extended and aids the pushing-off phase in walking. During the swing phase the knee flexes, causing release of tension so that the foot can clear the ground in the normal manner. A gradual decrease in the need for assistance usually compensates for the progressive loss of tension on the elastic band.

J. G. PARISH

Abstracts of the Literature

Iliopsoas Transfer for Weakness of the Hip Abductors (a Preliminary Report). W. T. MUSTARD. *J. Bone Jt Surg.*, 1952, **34A**, 647.

Paralysis or weakness of the hip abductor muscles allows the pelvis to tilt to the opposite side when the weight of the body is borne on the affected limb. A compensatory lurch to the affected side in order to regain balance produces a characteristic gait; accompanying this fatiguing and disfiguring limp is an external rotational deformity of the extremity. Although many procedures are recommended for restoring some function to hip abductor muscles paralysed by poliomyelitis, all of them fail to replace the stabilizing power of these muscles.

The author has developed a new and original procedure in utilizing the iliopsoas muscle for this purpose. The iliopsoas, lying on the inside of the pelvis, has the necessary muscle bulk to equal the hip abductor muscles, and the short fibres of the iliacus suggest that it would add to the power of stabilization rather than increase the range of motion. The innervation of this muscle is such that in poliomyelitis it is often spared when the hip abductors are involved. Anatomically the origin of the iliacus inside the pelvis is almost identical with that of the abductors on the outside. When the iliopsoas is tested electromyographically, with the needle electrode in the iliacus, muscle contractions are recorded if weight is borne on the side being tested, indicating that the iliopsoas stabilizes the hip.

In the author's procedure the iliopsoas muscle is detached with its insertion into the lesser trochanter and transferred through a notch cut in the wing of the ilium between the anterior superior and inferior spines to be attached on the shaft of the femur below the greater trochanter. To be suitable for this operation patients must have good or normal gluteus maximus and abdominal muscles to assist pelvic stability and a normal sartorius to act as a hip flexor. A good or normal rectus femoris is also useful.

This procedure was tried on 12 patients, but 5 of these were discounted for various reasons. In the remaining 7 patients hip stability was improved, the result in one being excellent.

O. F. VON WERSSOWETZ

Some Psychological Findings in the Rehabilitation of Amputees. M. P. MANSON and G. V. DEVIAS. *J. clin. Psychol.*, 1953, **9**, 65.

The social and psychological characteristics of 30 male amputees under treatment at the Veterans Administration Hospital, Long Beach, California, were studied. The patients were divided into two groups according to whether they had made a poor or a good adjustment to rehabilitation. A number of differences between the two groups were noted. The "good" group was younger, had larger percentages of married and smaller percentages of divorced and separated men, and was better educated. The "poor" group appeared to be more impulsive with tendencies for poor planning, had a higher percentage of unemployed preceding amputation, and was more maladjusted relative to the drinking of alcohol. The "poor" group also showed consistently greater weight losses following amputation than did the "good" group. There were some indications that the "good" group was more sensitive to pain and experienced more phantom pain.

J. G. PARISH

Abstracts of the Literature

The Repetimeter. R. A. SCHLESINGER. *Arch. phys. Med.*, 1952, **33**, 468.

Zander invented mechanical devices to take the place of remedial gymnasts, but because his machines were used largely for assistive exercises rather than for resistance exercises (of which many were capable) they fell into disuse. Now the present author advances a scheme which not only relieves the therapist of much work, but offers an exact method of preventing the patient from "cheating" when no one is looking.

The repetimeter is an electronic counter which adds up the number of electrical stimuli entering it. The electrical stimuli are supplied by a variety of "activators" or applicators. If the exercise is that of elevating the arm in abduction to 165 degrees, a lamp and "electric eye" are set at the height the hand must reach to intercept the beam. Then each time the patient's hand blocks the beam the activator sends an impulse to the "repetimeter" or counter. By the use of mercury switches, simple contact switches, and other easily made devices, this apparatus can be pre-set to ensure that the patient will exercise through the prescribed range for a given number of times in a given period.

[The author has added a desirable exactness to the measurement of exercise which will make the calculation of exercise dosage more precise than has hitherto been possible.]

SIDNEY LICHT

Some Practical Considerations in the Care of the Old. H. NISBETT. *Lancet*, 1953, **1**, 184.

The author discusses the problems which she encountered in introducing a rehabilitation regimen for over 600 elderly patients at a former poor law institution in Glasgow in 1949. Without the aid of elaborate equipment or physiotherapists she has been able to reduce the proportion of bedridden female patients from 95% in 1949 to 15% in more recent years. The aetiology of the sudden transient episodes of unconsciousness which frequently occur in the elderly, particularly after prolonged immobilization in bed, is discussed in detail. The problem of incontinence disappeared almost completely in patients who could be got up, and the tendency to be incontinent appeared to decrease as the patients became more mobile and less apathetic. The author found that the treatment of retention of urine by permanent suprapubic drainage to relieve prostatic obstruction tended to end in the permanent institutional care of the patient, and suggests that some form of prostatectomy is essential for successful rehabilitation.

J. G. PARISH

A Clinical Evaluation of Subcutaneous Achilles Tenotomy as an Aid in the Treatment of Intermittent Claudication. D. I. SCHWARTZ, L. L. PENNOCH, C. J. PESSOLANO, and D. S. LITTMAN. *J. Bone Jt Surg.*, 1952, **34A**, 619.

The relief of pain caused by intermittent claudication has long been a problem. Many forms of treatment have been employed to alleviate the condition, with varying degrees of success but usually disappointing results. The authors have used the procedure developed by Boyd of Manchester and his collaborators, which was adopted from veterinary medicine and consisted in sectioning a tendon near the hoof of a horse to relieve lameness due to vascular disease.

In this article the treatment of 10 patients by this method is evaluated. The authors describe their operative procedure. They state that the patient can usually walk with the aid of braces and a walking-stick the day after the operation. Prophylactic anticoagulant therapy is recommended because 3 of the 10 patients developed phlebitis.

In every instance considerable clinical improvement was noted. According to the authors the gait (which is always altered after the operation) can, with proper instruction, be restored in a short time and maintained without the aid of braces. Balance may be affected in some patients, but is usually recovered in a short time. There appears to be little residual disability, and fairly good plantar flexion is regained in a matter of months. It is stressed, however, that patients must be carefully selected for this procedure.

O. F. VON WERSSOWETZ

The Question of Tonus in Skeletal Muscle. H. J. RALSTON and B. LIBET. *Amer. J. phys. Med.*, 1953, **32**, 85.

The traditional concept of active muscle tone in the resting human subject has been shaken by the damaging testimony of electromyography, for in the relaxed subject the equipment available fails to record any electrical muscle potential. Even the hypothesis that stretch reflex discharge occurs automatically to help maintain a given postural attitude in normal man is not supported by available evidence. The authors explain active muscle tone as an incorrect interpretation of passive elastic tension of muscle, ligament, and tendon. Their arguments, supported by the reports of Sherrington, of Hoefer, and of Clemmesen, leave little room for rebuttal. "Speculation may be useful as a stimulus to thought, but in these days of facilitated authorship, mere repetition of a theory often leads to its uncritical acceptance."

SIDNEY LICHT

Serum Neuritis. ARTHUR L. WATKINS. *Arch. phys. Med.*, 1953, **36**, 231.

About 15% of subjects given prophylactic or therapeutic injections of horse serum develop serum sickness. There is no way of anticipating this reaction, since it occurs in the presence of negative reactions to sensitivity tests. A small percentage of patients with serum sickness develop peripheral neuritis. In seven years the author has seen 16 cases, in each of which there was muscle weakness in the right or both upper limbs regardless of the site of injection. The prognosis is generally regarded as good, yet in the present series at least 12 patients had failed to regain full muscle power a year later in spite of a vigorous programme of resistance exercises.

SIDNEY LICHT

Therapeutic Teaching—Group Work in Physical Therapy. M. HOBERMAN and E. F. CICENIA. *Arch. phys. Med.*, 1952, **33**, 539.

A programme of group exercises for the severely disabled in operation at the New York State Rehabilitation Hospital is detailed. To obtain satisfactory results it has been found necessary to reduce the size of the perambulatory mat class to a maximum of 10 patients and the functional activity groups to 8 patients.

J. G. PARISH

Abstracts of the Literature

Return of Function after Complete Transection of the Spinal Cord of the Rat, Cat and Dog. L. W. FREEMAN. *Ann. Surg.*, 1952, **136**, 193.

It is generally accepted that regeneration of the spinal cord cannot take place in mammals. The present author, however, sets out to prove that under ideal experimental conditions he can obtain a return of function. The primary points aimed at establishing that the spinal cord does *not* regenerate are: (1) there are no Schwann cells; (2) if spinal nerve cells do regenerate, it is an abortive process; (3) activity believed to represent functional return is on a reflex basis; (4) if transmission of stimuli is demonstrated, it results from extra-medullary pathways; or (5) the neural elements observed across the transected area are derived from spinal nerve roots.

The doctrine that Schwann cells are necessary for neural regeneration is supported by nothing but negative experimentation and deduction. Nerve cells do grow fibres in tissue culture in the absence of Schwann cells.

An early concept of spinal-cord activity was based on the work of Bastian and of Bruns, who indicated that residual reflex activity was a sign of an incompletely divided cord. When Head and his co-workers corrected this erroneous impression, opinion returned to the concept proposed by Schieffer-decker in 1876 that any functional activity observed was on a spinal-reflex basis. It is not difficult to detect the differences between purely reflex mechan-isms and those under some measure of cerebral control.

To prove that regeneration does occur the author completely transected the cord in the mid-dorsal region in rats, cats, and dogs. In the first few groups of more than 1,750 rats subjected to this procedure the mortality was about 20%, the major cause of death being urinary sepsis. Later this was reduced to almost *nil*. No functional return was seen in the first 175 animals. Forty-four rats recovered almost normal walking ability, and about twice that number had some degree of return. Only a few animals survived beyond three months without showing evidences of motor return.

The author further injected procaine into the spinal cords of a normal rat and one which had recovered after transection. Both animals showed complete paraplegia. Reflex action in the hind limbs was present in both, but was much more violent and sustained in the transected rat. As the effects of the procaine wore off both animals were able to walk. It is suggested that if the functional activity of the transected animal was purely reflex, it would not cease after transverse procaine block of the spinal cord. Furthermore, when the cord was surgically severed, paraplegia returned again.

Histological studies showed nerve fibres arising from all regions, including the white matter. It was clear that these fibres did not originate in the spinal nerve. The neural restitution observed was by no means reminiscent of the original pattern; indeed, the number of fibres traversing the area of transection in some animals was not great.

The author suggests that regeneration can take place in the divided human spinal cord. He believes that present-day ideas of treatment of the resultant paraplegia should be fundamentally revised. He contends that spinal-cord injuries should have immediate surgical debridement and decompression. Since the pia mater is the most important structure it should be opened widely. All foreign materials and devitalized bone and cartilage should be removed;

this will prevent excessive scarring. If the spinal cord were provided with a proper locus and the patient supported against catabolic changes, regeneration of spinal-cord tissue would be inevitable.

O. F. VON WERSSOWETZ

Legg–Perthes Disease. An Evaluation of Treatment by Traction and Ischial Weight-bearing Brace. C. H. HERNDON and C. H. HEYMAN. *J. Bone Jt Surg.*, 1952, **34A**, 25.

Although it is generally agreed that in Legg–Perthes disease pressure on the head of the femur is harmful and that weight-bearing is to be avoided, at least during the progressive phase of the disease, treatment differs remarkably, both as to method and as to duration. Some regard it as essential to protect the hip from any weight-bearing until regeneration is complete, and so confine the patient to bed for three to five years; others subscribe to Legg's opinion that treatment does not influence the result. Most orthopaedic surgeons adopt a method somewhere between these two extremes. The present authors adopted a compromise, treating all the cases described in this report by traction in bed until X-ray examination showed that regeneration of the epiphysis had begun. Then the patient was allowed up, the involved hip being protected with a Thomas ring traction brace; in addition an elevated shoe was worn on the opposite foot. The brace was retained until it appeared certain that no further flattening of the epiphysis would occur.

The authors studied clinically and radiologically 41 cases of Legge–Perthes disease, the average follow-up period being four to seven years. Only 4 patients finished up with a limp, and 3 complained of pain in the affected hip after strenuous exercise; 28 had a normal range of motion in the involved hip as compared with the sound one. Marked individual differences in the disease process were observed, and the authors believe this to be probably the most important factor influencing the end-result.

O. F. VON WERSSOWETZ

Influence of Frequency of Muscle Stimulation on Circulation in the Stimulated Extremity. K. G. WAKIM. *Arch. phys. Med.*, 1953, **34**, 291.

The sciatic and femoral nerves of anaesthetized dogs were stimulated with electrical impulses of one sigma duration, at frequencies varying from 4 to 256 per second. Blood flow in the stimulated limb was recorded with a bubble flowmeter. All frequencies of stimulation increased blood flow, but the rate of 16 per second was more effective than the next lower (8 per second) and the next higher (32 per second). The author points out that when the number of stimuli is more than 32 per second the periods of maintained contraction occupied by the contraction phases during every minute are of sufficient duration to interfere mechanically with the flow of blood into the contracted muscles. He concludes that for therapeutic stimulation a frequency of about 16 per second can be considered optimal.

In discussing this paper, Park pointed out that there is little or no correlation between the duration of the period of stimulation and the prevention of muscle atrophy. Therefore prevention of muscle atrophy by electrical stimulation is the result of metabolic properties intrinsic within muscle tissue, and change in rate of blood flow has no direct effect.

SIDNEY LICHT

Abstracts of the Literature

The Employment and Placing of Disabled Persons. L. B. BOURNE. *Med. Press*, 1952, **228**, 397.

The difficulties encountered in the resettlement of 204 disabled men and women referred to the medical interviewing committee of the Prince of Wales Hospital, Tottenham, London, are described. Patients suffering from diseases in the two largest groups (nervous diseases 22%, and psychoneurosis 16·6%) were the most difficult to place; 8 psychoneurotics were mentally defective and totally unemployable in any capacity, and others were unable to hold a job for longer than a few days. Amputations accounted for 4·9% of cases of disablement, and fractures and similar injuries for 9·3%. The low incidence of the latter was attributed to improved post-operative treatment. Diseases of the cardiovascular system accounted for 7·3% of cases, and chronic respiratory conditions for 8·3%. A considerable number of persons for one reason or other successfully avoided work in spite of their having little physical disability. Altogether only 21·5% disabled persons were successfully placed in work on the advice of the committee.

It is evident that the committee was dealing with the hard core of the unemployed disabled.

An estimate is made of the size of the problem of employment of disabled persons in Great Britain out of a total of just over a million. In March, 1952, 456 disabled persons were admitted to industrial rehabilitation units for vocational and disabled training, and at the end of this month 1,581 were in training at Government training centres.

J. G. PARISH

Cortisone as an Adjunct in the Rehabilitation of the Hemiplegic. H. I. RUSSEK, J. G. BENTON, H. BROWN, B. L. ZOHMAN, L. GREENE, A. KARA, A. A. DOERNER, and H. A. RUSK. *Amer. J. med. Sci.*, 1953, **225**, 147.

Cortisone was administered orally to 26 hemiplegic patients while they were undergoing a rehabilitation training programme. The patients were divided into two groups. In the first group, of 8 patients, the results of cortisone therapy were compared with those in a control group of 10 patients, 5 each on placebo and aspirin tablets of similar size, shape, taste, and colour. No significant effect was noted on the time needed for rehabilitation in the patients treated with cortisone as compared with the controls, as revealed by serial quantitative analysis of activities of daily living, range of action, and muscle strength. In the second series, of 18 patients, placebo therapy was given for two to three weeks before starting cortisone treatment. An acceleration in the rate of improvement in functional capacity was clinically observed in 6 of the cases during cortisone administration. Cortisone was found to have a striking effect in all patients in alleviating mental depression, minimizing pain in the extremities, and allaying anxiety, and allowed a fuller participation in the rehabilitation programme. It had no significant effect, however, on the electrocardiogram or on blood pressure, and did not appear to induce thrombo-embolic phenomena.

The authors consider that cortisone has a definite place in the treatment of hemiplegia, but that further studies on a larger series of patients are indicated.

J. G. PARISH

Abstracts of the Literature

Effect of Immobilization on Muscular Atrophy and Blood Flow. C. J. IMIG, B. F. RANDALL, and H. M. HINES. *Arch. phys. Med.*, 1953, **36**, 296.

The limbs of anaesthetized dogs were immobilized in plaster casts, some in the shortened position and others in the stretched position. After fourteen days of immobilization the blood flow through the immobilized and control limbs was measured with an electromagnetic flowmeter. In order to compare the amount of atrophy resulting from immobilization with that resulting from denervation, the sciatic and femoral nerves were sectioned in control animals. It was found that immobilization was accompanied by a significant increase in volume of blood flow through the femoral artery which persisted after removal of the cast. The amounts of atrophy in immobilization and denervation were almost equal. The temperature of the muscle under the cast was 0·5° C. higher than in the control limb.

From their experiments the authors conclude that ischaemia is not an important factor in atrophy of disuse.

SIDNEY LICHT

The Tilted Crutch Handpiece. H. W. PARK, W. MALONE, and R. STEGLICH. *Arch. phys. Med.*, 1952, **33**, 731.

Only two important modifications of the crutch were made in the first half of this century: adjustable length and the removal of the axillary piece (Canadian crutch). In this article the first important contribution to crutch construction of the second half of the century is made. When a cylinder is grasped by the hand which hangs freely at the side the cylinder will dip forward at an angle of from 5 to 30 degrees in normal adults, yet the commercially available crutch forces the hand into an unnatural rotation in order to grasp the conventional horizontal cross-piece. The authors have measured normal variations and have rebuilt cross-pieces to conform to the natural angle of the patient, with resultant improvement in weight-bearing alignment, lessened fatigue, fewer blisters, and greater acceptance of crutches.

SIDNEY LICHT

BOOK REVIEWS

Physical Medicine and Rehabilitation. Edited by BASIL KIERNANDER. Pp. 610. £3 3s. Oxford: Blackwell Scientific Publications.

In the opening remarks of his introduction to this book Lord Horder writes, "Attempts at defining Physical Medicine cannot be said to have met with much success." Although our concept of the subject is now becoming more clearly defined, the difficulties of an author who attempts to produce a book covering all aspects of physical medicine can readily be appreciated.

This book might more aptly have been entitled "Rehabilitation and Physical Medicine", for whereas the former is dealt with with remarkable completeness, there is no more than a brief account of some of the physical measures used in the diagnosis and treatment of certain special groups of diseases. The explanation of this apparent imbalance may perhaps be found in the foreword by the editor, where it is stated that "restoration of function is the aim of rehabilita-

tion and the term 'Physical Medicine' covers the methods used in this process" —a somewhat narrow view of physical medicine with which all will not agree.

The first two chapters of the book give a succinct account of the anatomy and physiology of the locomotor system, and there follow chapters on many aspects of rehabilitation, the subject being covered with a thoroughness and variety of opinion which do credit to the editor and his collaborators. The remaining chapters are devoted to physical therapy as employed in certain special groups of diseases. In the majority of these chapters the broad principles of these measures rather than exact techniques are described.

Rehabilitation is recognized as being the responsibility of every clinician regardless of his specialty, and this book must therefore appeal to all those who would wish to carry the treatment of their patients to the ultimate conclusion. In addition, clinicians may glean from the book how physical therapy may help in the treatment of special groups of diseases.

Those who practise physical medicine will find the chapters on rehabilitation well worthy of attention, but they may be disappointed in the content of many of the remaining chapters. This is in no sense a criticism of the book as a whole, for the editor states in the foreword that it is "intended primarily for the clinician who wishes to employ physical methods in diagnosis and treatment, and as such makes no attempt to describe the minutiae of technique thereby employed". It must be assumed that this reference is to clinicians in spheres other than physical medicine.

A. C. BOYLE

Medical Electricity for Massage Students. By HUGH MORRIS, M.D., D.M.R.E. 4th Edition. 27s. 6d. London: J. and A. Churchill.

The fourth edition of this well-known book is not greatly changed, but some sections have been rewritten, in particular those dealing with rectifiers and ultra-violet-light generators. In the preface the author draws attention to the difficulty of deciding how much to put in and how much to leave out when dealing with newer apparatus. One has the impression that the same difficulty must have been experienced in most sections, because too much is compressed into a book of modest size and material which is nowadays of little use to the student has been retained. For example, more than half a page of text and a half-page diagram are devoted to the condenser-discharge method of electrodiagnosis, although this technique has been superseded by the use of electronic apparatus. There are several other instances of space being used, at the expense of adequate reference to recent developments, for describing older apparatus and techniques although the text implies that they are now little used. The section on the application of medical electricity to the treatment of disease will not impress the medical reader. For instance, under "Shock" appears the lone and cryptic sentence, "Tonic heat baths, with the patient lying, are used for shock". Again, ozaena is dismissed by, "Treatment is usually ineffective, but zinc or copper ions may be ordered".

The general layout of the book is satisfactory. The text is good and well broken up by descriptive subheadings. The numerous diagrams are clear, and there is a comprehensive glossary and index. Much of the material is well suited to the purpose of the book, but it would be improved by the elimination of reference to older apparatus and to treatments little used or of doubtful value.

F. S. COOKSEY